1997-98 KIRIS ASSESSMENT
Open-Response Item Scoring Worksheet

Grade 7—Science Question 10

The **academic expectations** addressed by "Results of Damming a River" (Question 10) include

2.1 Students understand scientific ways of thinking and working and use those methods to solve real-life problems.

2.6 Students understand how living and nonliving things change over time and the factors that influence the changes.

The **core content** assessed by this item includes

Content

- Earth's Subsystems – Human activities change the earth's land, water, and atmosphere. Some of these changes decrease the capacity of the environment to support life forms.

Inquiry

- Developing descriptions, explanations, predictions, and models using evidence.

Results of Damming a River

The water level in many Kentucky rivers continually changes. As a result, many rivers in Kentucky have been channeled and dammed to control unpredictable water levels.

a. Describe **two** environmental changes that could occur from the damming of a river.

b. Briefly describe **one** long-term effect that could result from one of the environmental changes you described in **part a**. Explain your answer.

SCORING GUIDE
Grade 7 Science

Score	Description
4	The response is complete and demonstrates a strong understanding of environmental change over time. A thorough and accurate description of two changes from damming a river is given and a resulting long-term effect from one of those changes is described and explained.
3	The response addresses the question and demonstrates an understanding of environmental change over time, although minor errors and omissions may be present. An accurate description of one environmental change from damming a river is given and a resulting long-term effect from the change is described and explained.
2	The response addresses the question but demonstrates a limited understanding of environmental change over time. A description and/or explanation of at least one change from damming a river is included. The description of a resulting long-term effect may reveal misconceptions. The response may contain errors or omissions.
1	The response is incomplete and demonstrates a minimal understanding of environmental change over time. An attempt to describe change from damming a river or a resulting long-term effect is included; however, the response may contain major errors, misconceptions, and omissions.
0	Response is totally incorrect or irrelevant.
Blank	No response.

Sample Student Responses

Environmental changes: loss of life, erosion, flooding, change in sources of food or water

Long-term effects: habitat destruction/change; permanent change in water level; changes in predator/prey relationships; change in the food chain; migration; change in land use; flood control

Science Behind the Question

Environmental changes could include reduction of nutrients from less flooding, change in habitat in flooded areas, less loss of life due to flooding, etc. Results on the ecosystem could include change in habitat leading to migration, adaptation, or death; redistribution of water; interference with migration patterns; etc.

ANNOTATED STUDENT RESPONSE
Grade 7 Science

Sample 4-Point Response of Student Work

Student Response

Many rivers in Kentucky have been channeled and dammed to control unpredictable water levels. Two environmental changes that occur from the damming of rivers. One of these could affect certain fish, like trout, who need running water to either leave or die. Another could be that certain microrganisms, like baby mussels, need flowing water to travel away. Without this running water, the mussels would stay in one place.

The major long-term effect of the trout leaving would be that when they leave, the ecosystem would be injured. The trout usually eat insects that are still young or frys of other species. Without the trout, the insects would increase and other species would take over. Largemouth bass usually prey on small trout but without the trout, the bass might suffer. Lizards usually eat the eggs of trout and other species. Without the trout, the lizards won't have food and start preying on smaller fishes' eggs.

← Student correctly describes two environmental changes that could result from damming a river (i.e., certain fish, such as trout, either leave or die; certain microorganisms would not be able to move around).

← Student describes and thoroughly explains the long-term effect of trout leaving the dammed river.

Overall, student demonstrates a strong understanding of environmental change over time. Student accurately describes two changes that could occur from the damming of a river and accurately explains the long-term effect from one of those changes.

ANNOTATED STUDENT RESPONSE
Grade 7 Science

Sample 3-Point Response of Student Work

Student Response

A.) If you were to damme a river all the land it would cover would would most likely die and the trees that were many homes to many animals that wasn't cut down die avengaly or was washed off. Were I live we have a lake that waters are reless every winter. It's planly awful to see that scared land. It looked like something from a horror movie.

B.) A long term affect would be the movement of the animals. When the lake was first made many of animals had to flee with their lives. Many lost their lives in this movment such as baby geting seperated from their parants. The animals happitat is now gone forever more.

← Student generally describes two similar environmental changes that could result from damming a river (i.e., the land covered by the dammed river would "die"; trees that are homes to animals would eventually die or be "washed off"). Student's description of personal experience helps clarify the response.

← Student generally describes and explains one long-term effect related to the changes described in part a (i.e., many animals move from the area because their habitat is "gone forever").

Sample 2-Point Response of Student Work

Student Response

There could be many diffirent changes that could occur from the damming of a river, for example the river can over flow, this would make the river bigger and cause some animal life to die. Another example is some of the animals could die because of the dam being in there place and it could also help to. A long term effect that putting a dam in can cause is that there could be a lack of water for the people around the dam.

← Student describes two environmental changes that could occur as a result of damming a river (e.g., the river can overflow making the river bigger; some animals could die).

← Student attempts to describe a long-term effect but the answer is incorrect.

ANNOTATED STUDENT RESPONSE
Grade 7 Science

Sample 1-Point Response of Student Work

Student Response

Two enviormental changes would be one the water level might try to increase + overflow the river if it is being bloched in any way. That could cause flood + other disasters.

Student provides a minimal description of two related environmental changes that could occur from damming a river (i.e., water level might increase and overflow).

Student makes no direct reference to a long-term effect.

INSTRUCTIONAL STRATEGIES
Grade 7 Science

The open-response item "Results of Damming a River" was designed to assess the students' understanding of the concept that conservation methods such as damming a river can result in environmental changes which have long-term effects on the environment. The instructional strategies below present ideas for helping students explore and master this concept.

Discuss the following concepts and skills:

- An environmental change can be a change in a living or nonliving factor.
- Rivers are dammed for a variety of reasons, including flood control, hydroelectric power, recreation, and the need to provide a reservoir of water that can be accessed year-round for agriculture and people.
- When rivers are dammed, environmental changes occur both upstream and downstream from the dam.
- Environmental changes can have both short-term and long-term effects on the environment.
- Both positive and negative effects result from damming a river.

Have students work individually, in pairs, and/or in small groups to complete any or all of the following activities:

- Brainstorm a list of living and nonliving factors in a specific environment (e.g., a desert environment, a river environment).
- Identify rivers in the state which have been dammed and those which have not. Select a river that has been dammed and discuss reasons why the dam was built. Look at a map and predict which areas were affected when the dam was built. List possible short-term effects and long-term effects to wildlife, habitats, industries, people, etc. Identify a river that is not dammed and predict which areas would be affected by a dam and the possible short-term and long-term effects.
- Write a short story from the perspective of a factor in the environment such as a drop of water, a tree, or a squirrel, describing their experience when the river they exist in or near is dammed. (As an extension, the student could write two parts, one from the perspective of being upstream from the new dam and one from the perspective of being downstream.)
- Play the roles of stakeholders in the building of a dam in a mock legislative hearing. (Stakeholders might include farmers, water district planners, local residents, environmentalists, electric company officials, the mayor, etc.) Research the effects that a dam built on a local river would have on the area, and prepare a statement presenting their position on the building of the dam. (Students playing the role of state legislators will hear the arguments for and against building the dam.)